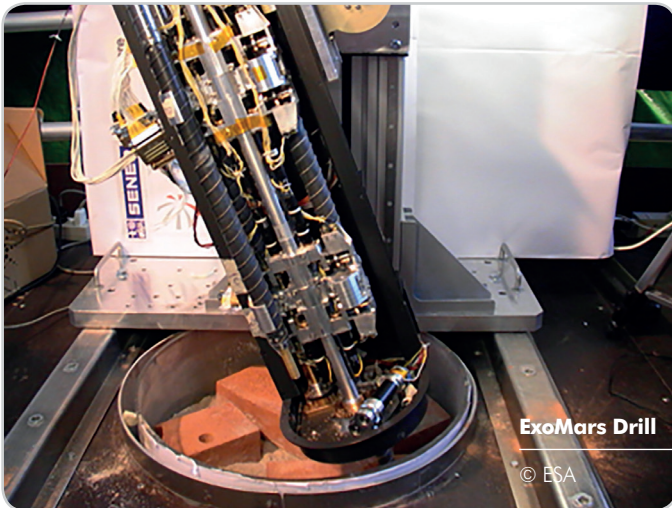


Context

The ExoMars rover is an autonomous robot that will travel across the Martian surface searching for life. It will drill up to two metres below the surface of Mars collecting small samples, transferring them to a laboratory in the heart of the vehicle; here they will be crushed to a fine powder and tested for molecules that might provide evidence of life.

In this activity, the children become a rover! They collect samples of various materials using a selection of pretend robotic arm drill tools, observe and describe the samples, before sending back the information to Earth.



Lesson starter

Show a hand drill or a picture of a drill. Who knows what this is? What is its job? Show the new robot, the ExoMars rover, that is being sent to planet Mars. It has a special drill!

exploration.esa.int/science-e/www/object/index.cfm?fobjectid=53910

The rover is controlled by computer programmes and it can travel over the surface of Mars on its six wheels. It can drill down under the soil, take samples and move them inside the rover to be tested.

exploration.esa.int/mars/45796-the-exomars-drill-video

It sends information down to scientists on Earth.

Resources

- Hand drill or photo

Per group:

- 3 rulers or lengths of dowl with tools eg fork, spoon, toothbrush
- Samples of the following in bowls:
 - › Vinegar
 - › Water
 - › Flour
 - › Cocoa powder
 - › Sugar
 - › Sand
 - › Grit
 - › Plasticine or playdough

National curriculum links

Science – materials:

- Identify and name everyday materials
- Describe simple properties of everyday materials and why they are suitable for particular uses
- Discover how materials can be changed

Design and technology:

- Select and use tools in practical taskwork cooperatively and organise activities



Main activity

This activity can be set up inside the classroom or outside. Explain that each group will pretend to be the ExoMars rover on the surface of Mars. Around them are interesting materials, numbered 1 to 8. Scientists back on Earth want to find out as much as they can about these materials. The challenge for the children is to collect a small amount of each material and bring it back to the rover. However, to do this they must stay inside the rover and use only the robot's arms! Finally they must describe each sample carefully for scientists on Earth to understand.

Show the samples and the tools available. Each of the arms has a tool attached. Which tool will be best for collecting each sample? How might they record their information? The children discuss. They may like to use Activity sheet 1a to draw and label their samples. Alternatively, they could use a voice recorder or take photos. Good luck!

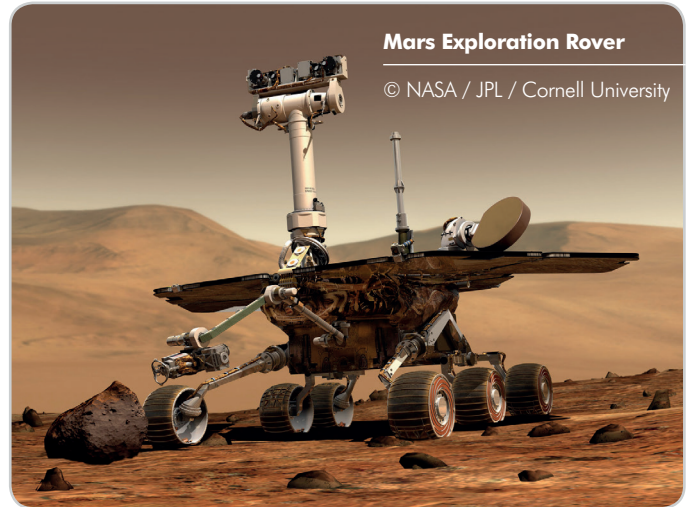
Plenary

- Did you guess what the samples were?
- What words did you use to describe the samples?
- Which tools did you choose for collecting the different materials?
- Were any samples difficult to bring back to the rover? Why?

Explain that space engineers design and build lots of things including rovers. They help to solve problems by testing models and often change their designs. How would you improve your robot arms?

Did you know there is another rover on planet Mars? Its name is Curiosity! Watch how it uses its drill to search for past and present life by taking soil samples:

www.jpl.nasa.gov/video/details.php?id=1189



Mars Exploration Rover

© NASA / JPL / Cornell University

Further activities

Design and build another tool to help collect samples on Mars or another machine for the rover to use.

Think of some other materials that you could sample with your robot arms.

Use scientific language to describe some everyday items without saying what each one is. Can your friends guess what they are?

STEM vocabulary

Machine	Runny	Smooth
Solid	Shiny	Soft
Liquid	Rough	Colour

solid liquid runny shiny rough smooth soft colour

1.

2.

3.

4.

5.

6.